

REMARKS

Claims 1–8 are pending in the application. In the Office action dated April 29, 2009, claims 1–8 were rejected. In view of the above amendments and the following remarks, Applicants respectfully request reconsideration of the application under 37 C.F.R. § 1.111.

Rejections under 35 U.S.C. § 112

Claims 5–8 are rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the enablement requirement. The Examiner contends that the claims contain subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

More specifically, the Examiner contends that "Forming the oxygen implanted layer" is not disclosed in the specification. In response, Applicants have amended claims 5–8 to recite "exposing the oxygen ion implanted layer."

In view of the above amendments, Applicants respectfully suggest that the subject matter of claims 5–8 is fully enabled by the specification, and request the withdrawal of the rejection of claims 5–8 under 35 U.S.C. § 112, first paragraph.

Claim Rejections under 35 USC § 102

Claims 1 and 6 are rejected under 35 U.S.C. § 102(b) as being anticipated by Imai et al. (JP 02228061).

Applicants respectfully disagree, but take this opportunity to amend claim 1 to additionally recite "removing the oxygen ion implanted layer". Support for the amendment can be found in the specification at page 8, line 20 to page 9, line 6; and in Fig. 1).

Applicants have discovered novel methods for manufacturing SOI wafers. In particular, the method claimed in claim 1 includes

- (i) implanting oxygen ions into the active layer wafer to form an oxygen ion implanted layer on the active layer wafer;

- (ii) reducing the oxygen in the vicinity of the surface layer of the active layer wafer by out diffusion by heat treating the active layer wafer on which the oxygen ion implanted layer has been formed in a reducing atmosphere;
- (iii) forming a laminated wafer by laminating the active layer wafer onto a base wafer with an insulating film interposed therebetween;
- (iv) allowing a portion of the active layer wafer to remain on the surface side of the oxygen ion implanted layer by grinding the active layer wafer portion of the laminated wafer;
- (v) exposing the oxygen ion implanted layer by polishing or etching a portion of the remaining active layer wafer;
- (vi) forming an oxide film of a predetermined thickness on the exposed surface of the oxygen ion implanted layer by oxidation treatment of the laminated wafer;
- (vii) removing the oxide film; and
- (viii) removing the oxygen ion implanted layer.

By virtue of claim element (vi), above, in addition to the oxygen ion implanted layer, an oxide film of a predetermined thickness can be formed. Therefore, it is possible to increase the margin width of the wafer for etching or polishing in the above claim elements (vii) and (viii).

The Imai reference (JP02228061) discloses forming an oxygen-ion-implanted layer by implanting ions into a main surface of a substrate, and removing the oxygen-ion-implanted layer. However, Imai does not disclose forming an oxide film of the predetermined thickness before removing the oxygen-ion-implanted layer. In Imai, since only the oxygen-ion-implanted layer is altered into an oxide (SiO_2), it is not possible to increase the margin width of the wafer for etching or polishing. Therefore, Imai does not disclose claim element (vi) to achieve the effect of the present invention, and claim element (vii).

In order to anticipate a claim under 35 U.S.C. § 102, a cited reference must disclose each and every element of the claim. As Imai fails to disclose each and every element of claim 1, as amended, Applicants suggest claim 1 is not anticipated by the Imai reference. Applicants further suggest that claim 6, which depends from claim 1, is also allowable for at least the reasons provided for claim 1.

In view of the above amendments and remarks, Applicants respectfully request the withdrawal of the rejection of claim 1 and 6 under 35 U.S.C. § 102.

Rejections under 35 U.S.C. § 103

Claims 3 and 5 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Imai et al. (JP 02228061) and Sakaguchi (US-2003/0087503).

The Examiner contends that it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the method of Imai and Sakaguchi to include the oxygen dose of $5.0E16$ to $5.0E17$ atoms/cm², since it has been held that claimed ranges of a result effective variable are unpatentable unless they produce a new and unexpected result. Applicants respectfully disagree.

As discussed above, the disclosure of Imai fails to disclose the claim element (vi) above, and so necessarily fails to achieve the above effect of the claimed invention and the above element (vii), and so the present Claim 1 is not anticipated by the description of Imai.

Sakaguchi (US-2003/0087503) discloses a method for producing an SOI structure, but similarly fails to disclose element (vi), and therefore fails to achieve the above effect of the claimed invention and the above element (vii).

In order to establish the *prima facie* obviousness of a claim, the cited references must disclose each and every element of the claim. As neither Imai nor Sakaguchi disclose the above element (vi) to achieve the above effect of the claimed invention and the above element (vii), Applicants respectfully suggest the Examiner has failed to establish the *prima facie* obviousness

of claims 3 and 5, which depend from Claim 1. Claims 3 and 5 are therefore not rendered obvious by the combination of Imai and Sakaguchi.

Claims 2, 4, and 7–8 are rejected under 35 U.S.C. § 013(a) as being unpatentable over Imai et al. in view of Yokokawa et al. (U.S. Patent no. 6,312,797).

Applicants respectfully disagree, but take this opportunity to amend claim 2 to additionally recite "removing the oxygen ion implanted layer". Support for the amendment can be found in the specification at page 8, line 20 to page 9, line 6; and in Fig. 1).

The method of claim 2 therefore includes the following elements:

- (xi) implanting ions of hydrogen or a noble gas element in an active layer wafer through an insulating film to form an ion implanted layer on the active layer wafer;
- (xii) laminating the active layer wafer to a base wafer with an insulating film interposed therebetween to form a laminated wafer;
- (xiii) heating the laminated wafer;
- separating a portion of the laminated wafer at the boundary with the ion implanted layer;
- (xiv) injecting oxygen ions from the separated surface of the SOI wafer following separation to form an oxygen ion implanted layer between the separated surface and the insulating film;
- (xv) exposing the oxygen ion implanted layer by polishing or etching a portion of the active layer wafer from the separated surface to the oxygen ion implanted layer;
- (xvi) forming an oxide film of a predetermined thickness on the exposed surface of the oxygen ion implanted layer by subjecting the SOI wafer to oxidation treatment; and,
- (xvii) removing the oxide film, and
- (xviii) removing the oxygen ion implanted layer.

By the above element (xvi), in addition to the oxygen ion implanted layer, the oxide film of a predetermined thickness can be formed. Therefore, it is possible to increase a margin width of the wafer for etching or polishing in the step of the above elements (xvii) and (xviii).

As discussed above, the Imai reference does not disclose the above elements (xvi) to (xvii).

Furthermore, although the Yokokawa reference (U.S. Patent no. 6,312,797) may disclose the above elements (xi) to (xiii), Yokokawa fails to disclose the above elements (xiv) to (xviii).

Therefore, neither Imai nor Yokokawa disclose the above elements (xvi) and (xvii) of the claimed method. Therefore, even if the disclosure of Imai and Yokokawa were combined, the above element (xvii) of the claimed invention cannot be entirely satisfied, and it is not possible to achieve the above effects of the claimed method. For at least these reasons, Applicants suggest that claim 2, and therefore claims 4, 7, and 8 which depend from claim 2, are not rendered *prima facie* obvious by the cited references.

For at least the reasons provided above, Applicants respectfully suggest that claims 2–5, 7, and 8 are not rendered obvious by the cited references, and they therefore request the withdrawal of the rejection of claims 2–5, 7, and 8 under 35 U.S.C. § 103.

In view of the above amendments and remarks, Applicants believe that the application is now in condition for allowance. Accordingly, Applicants respectfully request that the Examiner issue a Notice of Allowability covering the pending claims. If the Examiner has any questions, or if a telephone interview would in any way advance prosecution of the application, please contact the undersigned agent of record.

CERTIFICATE OF E-FILING

I hereby certify that this correspondence is being transmitted electronically via the United States Patent and Trademark Office EFS-Web System on July 29, 2009.

/ Stephen R. Pendleton

Stephen R. PENDLETON

Respectfully submitted,

KOLISCH HARTWELL, P.C.

/ Anton E. Skaugset /

Anton E. SKAUGSET

Reg. No. 38,617; Customer No. 23581

Agent for Applicant(s)/Assignee

520 S.W. Yamhill Street, Suite 200

Portland, Oregon 97204

Tel: (503) 224-6655; Fax: (503) 295-6679